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ABSTRACT

This document describes the module cluster "Mathematics Methods and Materials" to be used in a performance-based elementary teacher education program. General objectives of the module cluster are specified, and prerequisites to the cluster are identified. Titles of 19 modules within the cluster are listed. The overall structure of each module within the cluster is explained, and suggestions are given to participating students concerning how to organize for the module study. (DT)

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PROGRAM: Teachers for the Rural World
Teacher Corps Program
Idaho State University
Pocatello, Idaho 83201

COMPONENT: Curriculum Methods and Materials

MODULE CLUSTER: Mathematics Methods and Materials

DEVELOPER: Melvin E. Rexroat

DATE OF DEVELOPMENT: September, 1972

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CMM:006:00 (ISU) Mathematics Methods and Materials

GENERAL OBJECTIVES OF MODULE CLUSTER:

Modules included in this Module Cluster are designed to provide the opportunity for Interns to be exposed to a wide variety of methods and materials for teaching math at the elementary school level and to demonstrate their competencies in the following:

1. Application of Knowledge Competencies:

   Application of math symbols, concepts, materials and processes. (The Intern previously demonstrated the knowledges of math symbols, concepts, and processes during Module Clusters CSM:001:00 (ISU) and CSM:002:00 (ISU).

2. Performance Competencies:

   Ability to demonstrate at minimal performance levels, techniques with methods, materials and processes for the teaching of elementary school math.

3. Expressive or Experience Objectives:

   Experiences which a trainee will be required to complete or take part in without any intended development of competencies. (These experiences are considered important to broaden the trainee's perspective of math and learners.

4. Product or Consequence Objectives:

   The measurable "changes" in learners, due to instruction. (These objectives become the "real payoff" of methods and materials--developing learners facility with math.)

Each module will contain specific performance objectives from one or more of the above four (4) areas.

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PRE-REQUISITES TO THE MODULE CLUSTER:

Module Clusters CSM:001:00 (ISU) and CSM:002:00 (ISU).

MODULES WITHIN THE MODULE CLUSTER:

CMM:006:01 (ISU)	Orientation to Math Methods and Materials
CMM:006:02 (ISU)	Instructional and Learning Modes in Math
CMM:006:03 (ISU)	Math Objectives and Utilization of State Math Curriculum Guide.
CMM:006:04 (ISU)	Math Laboratory Approach
CMM:006:05 (ISU)	Math Lab Kits and Activities
CMM:006:06 (ISU)	Diagnostic Techniques in Math
CMM:006:07 (ISU)	Individualization in Math

NOTE: It is recommended that Modules :01 through :07 be completed in that order prior to completing other modules.

CMM:006:08 (ISU)	Methods and Materials: Number Theory and Number Operations Concepts
CMM:006:09 (ISU)	Methods and Materials: Sets and Concepts of Sets
CMM:006:10 (ISU)	Methods and Materials: Systems of Numeration and Historic Aspects of Math
CMM:006:11 (ISU)	Methods and Materials: Addition--Subtraction Concepts
CMM:006:12 (ISU)	Methods and Materials: Multiplication--Division Concepts
CMM:006:13 (ISU)	Methods and Materials: Rational Number Concepts
CMM:006:14 (ISU)	Methods and Materials: Decimal and Percentage Concepts
CMM:006:15 (ISU)	Methods and Materials: Measurement Concepts (Including METRIC System)
CMM:006:16 (ISU)	Methods and Materials: "Informal" Geometric Concepts

Modules Within the Module Cluster (continued).....

CMM:006:17 (ISU)	Methods and Materials: Special Topics--Topology, Probability, Logic, Functions, Relations.....
CMM:006:18 (ISU)	Experimental Math Curriculums
CMM:006:19 (ISU)	Methods and Materials: Problem Solving

TEXTS, REFERENCES AND MATERIALS

The following materials may be purchased from the ISU Bookstore at the costs shown:

1. Kidd, Myers, and Cilley: The Laboratory Approach to Mathematics; Science Research Associates, Inc., 259 East Erie Street, Chicago, Illinois--60611. 1970 (Paper--$4.50).

2. Dumas: Math Activities for Child Involvement; Allyn and Bacon, Inc., 470 Atlantic Ave., Boston, Massachussetts. 1971 (Paper--$4.95).

3. Packet of Cuisenaire Rods including: 74 Rods; Photo Text; Cuisenaire Reporter--$2.25.

In addition, Handouts will be attached to modules and lists of materials (or kits) identified in the modules may be borrowed from the TC Office, the ISU Instructional Materials Center, or obtained within the target schools. Trainees will be involved in preparing certain resources, but these will not usually necessitate purchases since easily obtainable materials can be utilized.

STRUCTURE OF MODULES IN THIS MODULE CLUSTER:

The format of each module will be similar and will include these elements:

1. Objectives: Each module will contain objectives from one or more of these categories: (Competencies specified in the objectives will be demonstrated as indicated.)

   a. Application of Knowledge Competencies: (Demonstrated via pencil and paper assessments and application experiences with learners.)

   b. Performance Competencies: (Demonstrated via application experiences with learners.)

   c. Expressive or Experience Objectives: (Demonstrated via "completion of the experience or activity but no measure of competency is taken.)

1. Objectives (continued).....

   d. Product or Consequence Objectives: (Demonstrated via gathering data about children's learning before and after instruction.)

2. Pre-Requisites: Some Objectives in the Module Cluster may require pre-requisite knowledges, skills or experiences; however, the competencies in most modules can "stand along" and may be studies in any order, as well as simultaneously. The Trainee will note that it is recommended that Modules CMM:006:01 through CMM:006:07 be completed in that order prior to other modules in the Module Cluster being studied.

3. Pre-Assessments: Pre-Assessments should be attempted and checked with Team Leaders. Pre-Assessments can provide diagnostic information for Trainees prior to instruction, such as;

   a. Competencies a Trainee already possesses (as demonstrated).

   b. Competencies not yet developed by a Trainee (unable to demonstrate).

   c. The nature of the Trainee's knowledges, skills, experiences.....

   d. Serves as a "learner set" for the Trainee prior to the study of a module.

   If a Trainee demonstrates Pre-Assessment competencies at or above the minimum level specified in the objectives, he may proceed to a new module unless he is required to complete an "Expressive/Experience Objective" OR "Product/Consequence Objectives."

4. Instructional Activities: These represent "equivalent practice" of competencies stated in Application of Knowledge and Performance Competency Objectives. The Trainee may feel free to choose from among those listed or create his own (provided the activities designed and carried out respond to the Objectives). Activities which respond to Expressive or Experience Objectives are required of the Trainee.

   Some application activities may need to be modified to fit a Trainee's own style or preference or to suit particular classroom environments in which the Trainee is working. When modifications are made in Instructional Activities, care should be exercised so that they still relate to the competencies in the objectives of the module.

   The "Microteaching Model" will often be employed in Application Experiences. Microteaching emphasizes:

   a. A brief time span of instruction (10 or so minutes).
   b. A small amount of content (usually one objective, skill, or task with 2 or 3 activities).
   c. A small group of learners (3-6 learners).

The emphases in Microteaching helps the Trainee to "practice and develop his own skills" by controlling time, content and number of learners. Often, when Interns attempt teaching for entire periods (30 to 40 minutes), covering rather large spans of content, and involving a full class of learners (30 or more), he has little opportunity to develop his own skills because he is preoccuptied with management problems--managing too many learners for too long a time, covering too much material. There is greater likelihood that a Trainee can handle these three instructional variables if he first gains some facility with his own teaching skills.

One additional aspect of Microteaching involves the gathering or receiving of feedback of the results. This aspect is almost totally lacking in situations where Trainees try out their skills. Such feedback is often obtained by such means as Video Tape Recordings or by an observer. Trainees will be given specific helps with Microteaching at the point of its use.

References and resources needed by Trainees for carrying out Instructional Activities in a module are specified in the descriptions of the Instructional Activities. When any item listed is not readily available, the Intern should supplement or supplant these with items available or obtainable with target schools or from other sources.

5. Post-Assessments: Exit behaviors of Trainees should meet or exceed minimal performance levels specified in the objectives; otherwise, remediational procedures should be utilized. This places considerable responsibility upon Trainees to become accountable for developing minimal performance competencies.

6. Remediational Activities: These are "situation-specific", that is, the results of a Trainee's efforts should be viewed individually and alternatives for remediation should be agreed upon in relation to the "specific situation." existing rather than upon repeating materials and activities already studied. Trainee's should agree upon these activities in consort with the Team Leader (and often, with the Cooperating Teacher). To be most helpful, Remediation Activities should be of a different type than previously studied.

ORGANIZING FOR MODULE STUDY

Each Trainee is urged to form a team with other Trainees (those who are also studying these modules). This structure will facilitate planning, organizing for instruction, teaching and getting feedback on the effectiveness of a Trainee's efforts. Much can be gained from observing each other during Application Experiences with learners, especially if the "Teacher" specifies what data he/she wishes the "observer" to gather. If a Trainee asks for feedback of a certain type, he is less likely to feel threatened or hurt. Trainees will find it necessary to "re-teach" a skill area in order to develop many of the competencies and skills included in the modules. To plan such "re-teach" sessions, the Trainee should utilize all the feedback available during the "initial teaching" session.

Techniques for obtaining and utilizing feedback will be emphasized throughout the Modules.